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NEW SPECIES OF MAMMALS FROM NORTHERN SOUTH AMERICA: A LONG-TONGUED BAT, GENUS *ANOURA* GRAY

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Abstract.—A new species of long-tongued bat, *Anoura latidens,* related to and sympatric with *Anoura geoffroyi* Gray is described. It is widespread and abundant in Venezuela, but elsewhere it is known only by single specimens from Colombia and Peru. The species of *Anoura* are keyed.

Mammals and their ectoparasites were collected in Venezuela between 1965 and 1968 by the Smithsonian Venezuela Project (SVP), supported in part by a contract (DA-49-MD-2788) of the Medical Research and Development Command, Office of the Surgeon General, U.S. Army. Numerous papers have described the ectoparasites and mammals of the Project. Throughout these papers undescribed species of mammals have been referred to by alphabetical designations. Some of these have been named subsequently by Handley and Ferris (1972), and Handley and Gordon (1979). In this paper I deal with another, a long-tongued bat of the genus *Anoura* Gray.

When I named *Anoura cultrata* (Handley, 1960) the genus *Anoura* was believed to include only two other species, *A. caudifera* É. Geoffroy St.-Hilaire and *A. geoffroyi* Gray. Then for several years the genus was thought to include five species (Jones and Carter 1976), but Nagorsen and Tamsitt (1981), with whom I agree, regarded *A. brevirostrum* Carter (1968) and *A. werckleae* Starrett (1969) as synonyms of *A. cultrata.* Now I describe another species, this one related to *A. geoffroyi.* It was discovered in a survey of the mammals of the Parque Nacional Henry Pittier ("Rancho Grande") in Venezuela in 1960. Later, many more specimens were collected in Venezuela by SVP personnel.

The cranial measurements reported here were taken as outlined by Handley (1959:98). Hind foot, tibia, calcar, and forearm were measured in the museum on dry specimens or on specimens preserved in alcohol. Other external dimensions were measured on fresh specimens in the field. All measurements are in millimeters. Coloration was determined under Examolites (Macbeth Corp., Newburg, New York 12553) with natural light excluded. Capitalized color terms are from Ridgway (1912).

Anoura latidens, new species

Holotype.—USNM No. 370119, adult female, skin and skull, collected 18 Aug 1965, by A. L. and M. D. Tuttle, on Pico Ávila, 2150 m, 5 km NNE Caracas (="Hotel Humbolt, 9.4 km N Caracas"), Distrito Federal, Venezuela, in mist net across trail through open forest; original number, SVP 629. This bat was pregnant when captured.

Etymology.—Latin, *latus,* broad, and *dens,* tooth, referring to the unusual breadth

Table 1.—Measurements of adult female *Anoura latidens* and *Anoura geoffroyi* of SVP collections from north (Los Venados, Pico Ávila, Mirimire) and south (Km 125, 68–85 km SSE El Dorado) of the Río Orinoco. For each measurement line 1 includes the mean plus or minus two standard errors, line 2 the extremes, and line 3 sample size in parentheses.

Total length	Hind foot (dry)	Ear	Forearm	Greatest length	Zygomatic breadth	Postorbital breadth
			Anoura latidens: Km 125			
66.3 ± 1.46	11.9 ± 0.26	14.8 ± 0.54	43.7 ± 0.46	24.5 ± 0.14	10.6 ± 0.10	5.0 ± 0.04
62—72	11—13	13—17	41.8—45.7	23.9—25.3	10.2—11.2	4.8—5.3
(18)	(18)	(18)	(18)	(27)	(23)	(27)
			Anoura latidens: Los Venados and Pico Ávila			
67.6 ± 2.24	11.4 ± 0.28	13.4 ± 0.78	42.3 ± 0.48	23.9 ± 0.30	10.4 ± 0.12	4.9 ± 0.08
61—77	11—12	11—15	40.3—43.3	22.1—24.6	9.9—10.7	4.6—5.2
(14)	(14)	(14)	(14)	(15)	(15)	(15)
			Anoura geoffroyi: Km 125			
65.9 ± 1.24	11.9 ± 0.26	15.2 ± 0.52	42.5 ± 0.50	25.2 ± 0.16	10.7 ± 0.14	4.9 ± 0.06
61—70	11—13	13—17	41.3—44.9	24.4—25.8	10.2—11.2	4.6—5.2
(17)	(16)	(17)	(16)	(22)	(20)	(22)
			Anoura geoffroyi: Mirimire			
74.7 ± 2.30	11.6 ± 0.40	16.4 ± 0.60	42.0 ± 1.10	24.6 ± 0.26	10.4 ± 0.26	4.9 ± 0.06
70—79	11—12	15—17	39.2—43.9	24.2—25.0	9.9—10.6	4.8—5.0
(7)	(7)	(7)	(7)	(7)	(5)	(7)

Table 1.—(Continued).

Braincase breadth	Braincase depth	Maxillary toothrow	Postpalatal length	Width at molars	Width at canines	Tibia
			Anoura latidens: Km 125			
9.7 ± 0.06	7.6 ± 0.08	9.3 ± 0.08	9.1 ± 0.08	6.2 ± 0.06	4.1 ± 0.06	14.2 ± 0.20
9.3—10.1	7.2—8.0	8.7—9.6	8.6—9.5	5.7—6.5	3.8—4.4	13.3—15.0
(27)	(27)	(27)	(26)	(26)	(26)	(18)
			Anoura latidens: Los Venados and Pico Ávila			
9.6 ± 0.10	7.4 ± 0.10	9.2 ± 0.12	8.8 ± 0.16	6.0 ± 0.12	4.0 ± 0.08	14.4 ± 0.26
9.1—10.0	7.1—7.8	8.6—9.4	8.0—9.3	5.7—6.3	3.8—4.2	13.5—15.0
(15)	(15)	(15)	(15)	(15)	(15)	(14)
			Anoura geoffroyi: Km 125			
9.8 ± 0.08	7.6 ± 0.08	9.6 ± 0.08	8.9 ± 0.18	6.2 ± 0.08	4.2 ± 0.08	13.8 ± 0.16
9.5—10.2	7.3—8.0	9.2—10.0	8.1—9.6	5.9—6.5	4.0—4.6	13.4—14.5
(22)	(22)	(20)	(21)	(22)	(18)	(16)
			Anoura geoffroyi: Mirimire			
9.6 ± 0.12	7.4 ± 0.20	9.4 ± 0.12	8.8 ± 0.26	6.0 ± 0.12	4.2 ± 0.08	13.8 ± 0.28
9.3—9.8	7.0—7.7	9.1—9.5	8.4—9.3	5.8—6.2	4.1—4.4	13.2—14.2
(7)	(6)	(7)	(6)	(6)	(7)	(7)

Table 2.—Measurements of adult male *Anoura latidens* and *Anoura geoffroyi* of SVP collections from north (Los Venados, Pico Ávila, Mirimire) and south (km 125, 68–85 km SSE El Dorado) of the Río Orinoco. For each measurement line 1 includes the mean plus or minus two standard errors, line 2 the extremes, and line 3 sample size in parentheses.

Total length	Hind foot (dry)	Ear	Forearm	Greatest length	Zygomatic breadth	Postorbital breadth
			Anoura latidens: Km 125			
65.4 ± 1.46	12.0 ± 0.00	15.0 ± 0.38	43.7 ± 0.84	24.4 ± 0.20	10.7 ± 0.24	5.0 ± 0.08
63—68	12—12	14—16	42.0—45.7	24.0—25.1	10.0—11.1	4.8—5.2
(8)	(8)	(8)	(8)	(11)	(9)	(11)
			Anoura latidens: Los Venados and Pico Ávila			
64.8 ± 2.70	11.2 ± 0.34	13.7 ± 1.42	41.3 ± 0.54	23.8 ± 0.28	10.5 ± 0.18	4.9 ± 0.08
59—68	11—12	11—16	40.2—42.0	23.5—24.4	10.2—10.8	4.8—5.0
(6)	(6)	(6)	(6)	(6)	(6)	(6)
			Anoura geoffroyi: Km 125			
65.2 ± 2.32	11.9 ± 0.46	15.3 ± 0.60	42.7 ± 0.46	25.4 ± 0.36	10.8 ± 0.16	4.9 ± 0.12
58—72	11—13	14—17	41.5—43.6	24.4—26.5	10.4—11.5	4.6—5.2
(10)	(10)	(10)	(10)	(12)	(12)	(12)
			Anoura geoffroyi: Mirimire			
72.0 ± 2.32	11.8 ± 0.50	16.9 ± 0.26	42.5 ± 0.56	25.0 ± 0.26	10.8 ± 0.18	4.8 ± 0.14
68–76	11—13	16—17	41.3—43.6	24.3—25.4	10.4—11.2	4.4—5.0
(8)	(8)	(8)	(8)	(8)	(7)	(8)

Table 2.—(Continued).

Braincase breadth	Braincase depth	Maxillary toothrow	Postpalatal length	Width at molars	Width at canines	Tibia
			Anoura latidens: Km 125			
9.6 ± 0.08	7.4 ± 0.16	9.2 ± 0.12	9.0 ± 0.16	6.2 ± 0.06	4.4 ± 0.06	14.1 ± 0.50
9.4—9.8	7.0—7.9	8.8–9.5	8.7—9.5	6.0—6.4	4.2—4.5	13.2—15.1
(10)	(11)	(11)	(10)	(11)	(11)	(8)
			Anoura latidens: Los Venados and Pico Ávila			
9.7 ± 0.16	7.5 ± 0.10	9.3 ± 0.20	8.8 ± 0.24	6.2 ± 0.14	4.3 ± 0.06	13.7 ± 0.58
9.6—10.1	7.3—7.6	8.9—9.6	8.5—9.2	6.0—6.4	4.2—4.4	12.5—14.6
(6)	(6)	(6)	(6)	(6)	(6)	(6)
			Anoura geoffroyi: Km 125			
9.9 ± 0.10	7.6 ± 0.16	9.7 ± 0.18	9.2 ± 0.16	6.3 ± 0.16	4.5 ± 0.08	14.0 ± 0.26
9.5—10.1	7.2—8.2	9.1—10.2	8.8—9.6	5.8—6.7	4.2—4.8	13.4—14.8
(11)	(12)	(12)	(11)	(11)	(12)	(10)
			Anoura geoffroyi: Mirimire			
9.8 ± 0.16	7.7 ± 0.06	9.5 ± 0.10	9.0 ± 0.26	6.2 ± 0.14	4.5 ± 0.10	13.8 ± 0.12
9.5—10.3	7.5—7.8	9.4—9.8	8.5—9.5	6.0—6.5	4.4—4.7	13.6—14.0
(8)	(8)	(7)	(8)	(7)	(7)	(8)

of P4 and the other premolars. This taxon has been referred to as "*Anoura* sp. A" in previous publications dealing with the collections of the SVP.

Distribution.—Widely distributed in Venezuela—in the foothills of the Sierra de Perijá and the Mérida Andes, at medium and high elevations in the Sierra de la Costa and in mountains in the Northeast, at three localities in Bolívar state, and in the Ventuari Basin. Outside Venezuela, known only by a single specimen each from Colombia and central Peru. Probably also extends to adjacent parts of Brazil, Guyana, and Ecuador.

SVP collectors netted *Anoura latidens* (n = 105) most often in moist situations (93 percent); in evergreen forest (71 percent), but also in yards and orchards (28 percent), and once in arid thorn scrub (1 percent). Elevation range 50–2240 m (81 percent below 1500 m). Holdridge life zones (Ewel and Madriz 1968): Tropical dry forest (3 percent), Tropical humid forest (28 percent), Premontane thorny forest (1 percent), Premontane humid forest (2 percent), Premontane very humid forest (48 percent), and Lower Montane humid forest (18 percent).

Description.—In size similar to *Anoura geoffroyi*: skull averages slightly smaller, but body averages slightly larger (Tables 1 and 2). Dorsal coloration resembles that of *A. geoffroyi* but averages paler and browner, less blackish (between Verona Brown and Warm Sepia); hair bases on nape near Cartidge Buff, on remainder of dorsum somewhat grayer; chin, throat, and chest paler than remainder of underparts, often whitish; abdomen near Sepia; bases of abdominal hairs brown to gray-brown, not well differentiated from buffy tips; and ears and membranes average paler than in *A. geoffroyi*.

Skull, mandible, and teeth similar to those of *Anoura geoffroyi* but rostrum relatively short, nearly parallel-sided, and with little bulge at canine bases; braincase relatively inflated; zygomata always incomplete; posterolateral edges of palate (behind toothrows) strongly pointed; horizontal ramus of mandible shallow and usually depressed anteriorly; coronoid-articular distance of ascending ramus short; P3 and P4 relatively wide (thick) and usually shortened; anterobasal cusp of P3 usually reduced; and medial internal cusp of P4 enlarged, rendering basal outline of tooth approximately triangular; $P\bar{3}$ and $P\bar{4}$ wide and usually long.

Measurements.—Holotype female, adult: Total length 66, tail vertebrae 0, hind foot (dry) 11, ear fron notch 13, forearm 42.3, tibia 14.7, calcar 4.5.

Greatest length of skull 24.0, zygomatic breadth 10.7, postorbital breadth 4.8, braincase breadth 9.5, braincase depth 7.5, maxillary toothrow length 9.1, postpalatal length 8.5, palatal breadth outside of M3 5.8, rostral breadth at base of canines 4.0.

Additional measurements: Tables 1 and 2.

Comparisons.—*Anoura latidens* is sympatric with three other species of *Anoura*. From *Anoura caudifera* it is easily recognized by its larger size (e.g., forearm 40–45 vs. 35–39, maxillary toothrow 8.6–9.7 vs. 7.8–8.7), lack of tail, incomplete zygomata, presence of medial internal cusp on P4, presence of anteroexternal cusp and crest on M1, and comparatively long, low $P\bar{4}$. Note that most authors, following Husson (1962:139), have used the name *Anoura caudifer* on the grounds that this was the spelling of the specific name originally proposed by É. Geoffroy St.-Hilaire (1818:418, *Glossophaga caudifer*). However, É. Goffroy St.-Hilaire was in error and so have been all authors (including me) who have used the masculine form "*caudifer*" in combination with the generic names *Glossophaga, Loncho-*

glossa, or *Anoura,* all feminine nouns. In this instance, the specific name is an adjectival modifer, and as such it must agree in gender with the generic name. Thus, *Anoura caudifera.*

Compared with *Anoura cultrata, Anoura latidens* has coloration paler throughout, tail absent, skull much less robust, zygomata incomplete, upper canine much smaller, postcanine teeth (except $P\bar{1}$) more robust, and $P\bar{1}$ not enlarged or blade-like.

Anoura latidens is most like *A. geoffroyi,* but it can be distinguished by numerous characteristics: P3 and P4 (both upper and lower) thicker and more robust; lingual cusp of $P\underline{4}$ enclosed in more or less triangular basal outline of tooth (vs. prominently protruding from narrow basal outline of tooth); $P\bar{4}$ nearly crescent-shaped, with both front and hind ends flexed inward (vs. nearly straight or with the hind end flexed outward); rostrum shorter; canine slightly smaller and less bulging at base; posterolateral edge of palate usually more strongly pointed (vs. usually more rounded and often with multiple points); zygoma always incomplete (vs. always complete in southern Venezuelan and variable in northern Venezuelan *A. geoffroyi*); horizontal ramus of mandible shallower and usually depressed (not straight) anteriorly; dorsal coloration usually paler, grayish-brown rather than blackish-brown; chin, throat, and chest pale (vs. undifferentiated from remainder of underparts); bases of abdominal hairs not well differentiated from tips, which are seldom whitish and never impart a "frosted" appearance as they often do in *A. geoffroyi.*

Both *A. geoffroyi* and *A. latidens* show a slight amount of geographical variation between northern and southern Venezuelan populations, isolated from one another by the Llanos. The degree of differentiation is a little greater in *Anoura latidens,* suggesting a different evolutionary history (Tables 1 and 2).

Key to Species of *Anoura*

1. First lower premolar greatly enlarged and blade-like; upper canine unusually large and with prominent longitudinal sulcus on anterior face ..... *Anoura cultrata*
– First lower premolar approximately same size and shape as other premolars; upper canine not enlarged and its anterior face flat 2
2. $P\underline{4}$ without medial internal cusp; $M\underline{1}$ without anteroexternal cusp and crest; tail present ..... *Anoura caudifera*
– $P\underline{4}$ with medial internal cusp; $M\underline{1}$ with anteroexternal cusp and crest; tail absent 3
3. Medial internal cusp of $P\underline{4}$ enclosed in broad triangular base of tooth; upper and lower P3 and P4 thick ..... *Anoura latidens*
– Medial internal cusp of $P\underline{4}$ prominently protrudes from narrow base of tooth; upper and lower P3 and P4 narrow ..... *Anoura geoffroyi*

Ecology.—In the SVP collections *Anoura latidens* proved to be almost as numerous and widespread in Venezuela as *A. geoffroyi,* its closest relative. Surprisingly, *A. latidens* is represented by only two specimens in the extensive collections of *Anoura* in the American Museum of Natural History and by none at all in the collections of the British Museum (Natural History) and the Field Museum of

Natural History. Although I have seen hundreds of specimens of *A. geoffroyi* that were collected in the 19th and early 20th centuries, I have found only one *A. latidens* AMNH 69187, San Juan de Río Seco, Colombia, December 1923, Br. Niceforo María) that was collected prior to 1960.

Either *Anoura geoffroyi,* or *A. latidens,* or both inhabited 26 localities in forested portions of Venezuela sampled by SVP. *Anoura geoffroyi* proved to be more widespread. It was found at 22 of the 26 localities, while *A. latidens* was taken at only 14. However, *A. latidens* outnumbered *A. geoffroyi* at six of the ten localities where the two species were taken together.

The SVP records do not reveal any ecological or geographical segregation of *Anoura latidens* and *A. geoffroyi* in Venezuela. Although taken frequently in lowlands, both species were found most often (60 percent) at montane localities: *A. geoffroyi* to 2550 m near Tabay in the Andes and *A. latidens* to 2240 m on Pico Ávila in the Coast Range. Both were most numerous in the 1000–1500 m interval. Both were taken most often in moist situations in evergreen forest. About 30 percent of the total catch of each species was in openings.

Specimens examined (*Anoura latidens*).—**Colombia:** CUNDINAMARCA, San Juan, Río Seco, (1 AMNH). **Peru:** JUNÍN, Prov. Tarma, 2 km NW San Ramón, 884 m, (1 AMNH). **Venezuela** (all USNM unless otherwise noted): ARAGUA, El Limón, 4 km NW Maracay, 524 m, (3); Est. Biol. Rancho Grande, Paso El Portochuelo and Pico Guacamayo, 13 km NW Maracay, 1130 m, (6). BARINAS, Altamira, 794 m, (1). BOLÍVAR, El Manaco, 59 km SE El Dorado, 150 m, (12); Hato la Florida, 47 km ESE Caicara, 50 m, (3); Km 125, 85 km SSE El Dorado, 1032–1165 m, (44). CARABOBO, La Copa, 4 km NW Montalbán, 1537 m, (4); Montalbán, 598 m, (2). DTO. FEDERAL, Los Venados, 4 km NNW Caracas, 1465–1524 m, (9); Pico Ávila, nr. Hotel Humboldt, and Boca de Tigre, 5 km NNE and 6 km NNW Caracas, 2092–2240 m, (13). FALCÓN, nr. La Pastora, 16 km ENE Mirimire, 70 m, (1). LARA, La Concordia, 47 km NE El Tocuyo, 592 m, (1). MONAGAS, Caripe, 1000 m, (2); Pico de Cerro Negro, Dto. Caripe, 2200 m, (1 UCV); Finca San José, 10 km NE Caripe, (1); San Agustín, 3 km NW Caripe, 1345 m, (1). SUCRE, Manacal, 26 km ESE Carúpano, 366–380 m, (2). T. F. AMAZONAS, San Juan, Río Manapiare, 163 km ESE Pto. Ayacucho, 155 m, (15). ZULIA, Novito, 19 km WSW Machiques, 1135 m, (2). Total 117.

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Literature Cited

Carter, D. C. 1968. A new species of *Anoura* (Mammalia: Chiroptera: Phyllostomidae) from South America.—Proceedings of the Biological Society of Washington 81:427–430.

Ewel, J. J., and A. Madriz. 1968. Zonas de vida de Venezuela.—Ministerio de Agricultura y Cria. Caracas. 265pp., map.

Geoffroy Saint-Hilaire, É. 1818. Sur de nouvelles chauve-souris, sous le nom de Glossophages.—Mémoires du Muséum d'Histoire Naturelle (Paris) 4:411–418, pls. 17–18.

Handley, C. O., Jr. 1959. A revision of American bats of the genera Euderma and Plecotus.—Proceedings of the United States National Museum 110:95–246.

———. 1960. Descriptions of new bats from Panama.—Proceedings of the United States National Museum 112:459–479.

———. 1976. Mammals of the Smithsonian Venezuelan Project.—Brigham Young University Science Bulletin, Biological Series 20(5):1–91.

———, and K. C. Ferris. 1972. Descriptions of new bats of the genus *Vampyrops*.—Proceedings of the Biological Society of Washington 84:519–523.

———, and L. K. Gordon. 1979. New species of mammals from northern South America. Mouse possums, genus *Marmosa* Gray, pp. 65–72. *In* J. F. Eisenberg, ed. Vertebrate ecology in the northern neotropics.—Symposia of the National Zoological Park, Smithsonian Institution Press, Washington.

Husson, A. M. 1962. The bats of Suriname.—Zoologische Verhandelingen, Rijksmuseum van Natuurlijke Historie, Leiden 58:1–282.

Jones, J. K., Jr., and D. C. Carter. 1976. Annotated checklist, with keys to subfamilies and genera, pp. 7–38. *In* R. J. Baker, J. K. Jones, Jr., and D. C. Carter, eds. Biology of bats of the New World family Phyllostomatidae, pt. 1.—Special Publications, The Museum, Texas Tech University 10.

Nagorsen, D., and J. R. Tamsitt. 1981. Systematics of *Anoura cultrata, A. brevirostrum,* and *A. werckleae*.—Journal of Mammalogy 62:82–100.

Ridgway, R. 1912. Color standards and color nomenclature. [iv + 44 pp., 53 pls., Washington.]

Starrett, A. 1969. A new species of *Anoura* (Chiroptera: Phyllostomatidae) from Costa Rica.—Los Angeles County Museum Contributions in Science 157:1–9.

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